

THIS DEVICE IS NICE FOR DETECTING ICE

A simple, low-cost sensor reliably detects and measures ice formation on aircraft airfoils during flight, helping pilots avoid the danger of icing.



■ Innovative Dynamics' technology will soon detect and remove ice on the Raytheon Premier 1, a light business jet (pictured above, courtesy of Raytheon Aircraft).

Icing was a contributing factor in at least eight fatal crashes involving U.S. commercial aircraft in the past decade, including the 1994 crash of an American Eagle ATR-72 turboprop in Roselawn, Indiana, that killed all 68 people onboard. Government investigators say ice has led to many accidents and near crashes over the years, including a 1993 incident involving a Continental Express Embraer 120 that suddenly spun out of control and plunged 12,000 feet before the pilot regained control and made an emergency landing.

Despite that history, most aircraft still rely on fairly primitive systems to monitor and remove ice. According to the *Wall Street Journal*, as late as 1997 the Federal Aviation Administration (FAA) still advised pilots of commuter planes that the best way to detect hazardous icing is to look out of the window for the telltale signs of buildup. Unfortunately, it is not always easy for the pilot to tell if clear ice is accumulating.

Addressing this problem, Innovative Dynamics, Inc. (IDI; Ithaca, NY), has developed an ice sensor that can automatically alert pilots when ice is forming. By providing advanced warning of icy buildup, the sensor allows pilots to either activate the deicing system to break ice up in flight or change the plane's flight path to take it out of harm's way. The sensor's flush-mounted design allows installation on fuel tanks and other surfaces that should not be penetrated, a capability that distinguishes it from competing devices. The low-cost ice sensor can be retrofitted to existing aircraft or embedded in new anti-ice and deicing systems.

Sensor blankets. IDI's ice sensor uses ultrasensitive capacitance electronics to measure small amounts of ice buildup on aircraft surfaces. Blankets of thin-film sensors placed along the surface of the wing detect small changes in the dielectric constants of air, ice, and water. Noting the differences in dielectric constants allows the sensor system not only to discern ice from water, but to track the ice from its onset to a critical thickness threshold.

"The two biggest advantages of the technology are its nonintrusiveness and its ability to cover large surfaces," says Joseph Gerardi, IDI's president. "It doesn't stick out and vibrate in the wind like older probe technology. And it can be made in sheets to cover the entire wing." Mr. Gerardi indicated that BMDO- and NASA-funded SBIR contracts played a major role in advancing IDI's capacitance sensor technology. BMDO's interests lie in using the technology as part of a structural health monitoring system for satellites.

Smart deice. IDI's ice sensor is being incorporated into several "smart" products for detecting ice on aircraft, highways, and refrigeration systems. For example, through a licensing agreement with IDI, the sensor technology was transferred to BF Goodrich Aerospace (Uniontown, OH), a manufacturer of pneumatic deicing systems for business and commercial aircraft. In another example, IDI is working with the Department of Transportation to refine the sensor for use in detecting icy road conditions on smart highways. In addition, the company recently met with a major appliance manufacturer that is interested in using the sensor technology in consumer freezers.

IDI has developed a complete deicing package for small aircraft, called the Impulsive Deicing System (IDS), which uses the ice sensor to automatically activate a deicing system. The IDS is currently being evaluated by several aircraft manufacturers, including Boeing and Bell Helicopter, for possible integration into future jet aircraft. Prototype systems have been delivered to Cessna and Raytheon Aircraft for evaluation, and the system has successfully completed flight testing in airborne icing conditions. Raytheon is in the process of FAA-certifying the IDS for use on its Premier series of business jets. IDI is working with Cox and Company to manufacture components of the deicing system.

■ For more information, contact Gail Hickman via telephone at (607) 257-0533 or via E-mail at idi@innodyn.com. You can also visit IDI's Web site at <http://www.lightlink.com/idi>.



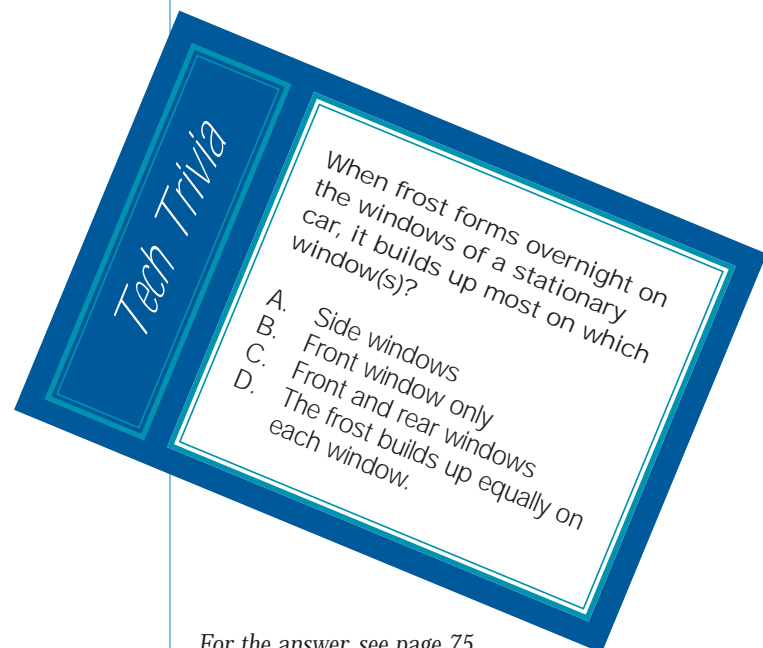
What Does It Mean to You?

Ice sensors will help pilots keep airplane wings free from ice in flight, making air travel safer over mountainous areas, the Great Lakes, and Alaska where icing is most likely to occur.



What Does It Mean to Our Nation?

Pilots of commuter aircraft could avoid fatal crashes and accidents by relying on ice sensors, instead of visual clues, to detect signs of hazardous ice.



For the answer, see page 75.